GIS Data for Research to Support Ecosystem-based Management - SEFSC

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Abstract

Research to support ecosystem-based management calls for availability of spatial data related to fisheries, protected species, and environmental variables. SEFSC staff has been collecting datasets in the southeast region that are both fisheries-dependent and fisheries-independent. Descriptions will be given on selected datasets, as well as GIS tools used by researchers. An attempt will be made to identify the gaps in GIS data and tools for effectively conducting research for the purpose of ecosystem-based management.

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Steven Wong, Physical Scientist, NMFS SEFSC

Overview

- Role of GIS
- Improving spatial utility of fisheries data
- A science-driven ecosystem GIS
- Sharing resources

Role of GIS

- Data collection
- Data visualization
- Data validation
- Hypothesis generation
- Data analysis
- Data modeling

Data Collection

- Logbook, Trip interview, Observer
- Resource transect surveys – Reef fish visual census, aerial/shipboard surveys of mammals/turtles, in situ environmental data
- Tagging
- Southeast Area Monitoring and Assessment Program (SEAMAP) – icthyoplankton, groundfish, hypoxia zones, etc.
- Stranding of mammals/turtles
- Socioeconomic surveys
- Acoustic mapping of habitats
- Management boundaries

Data collection

McClellan, D. 1996. **Aerial surveys for sea turtles, marine mammals, and vessel activity along the southeast Florida coast**. NOAA Tech Memo SEFSC 390

Objective:

Build a long-term database on vessel locations/activities, and sightings of animals

Technique:

Evolved from paper data entry to digital data entry with ArcView Tracking Analyst Extension

Data analysis

Objective:

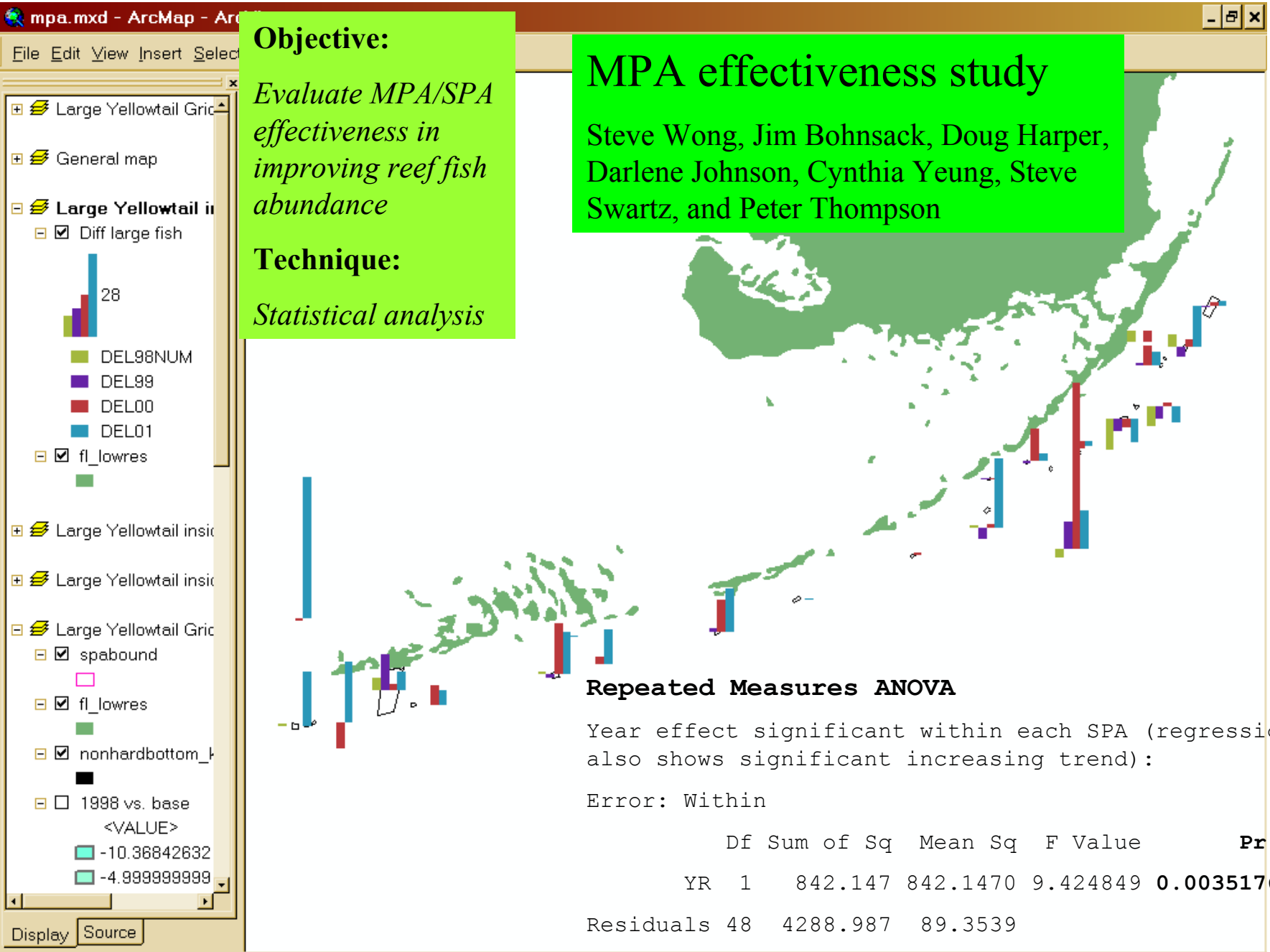
Evaluate MPA/SPA effectiveness in improving reef fish abundance

Technique:

Statistical analysis

MPA effectiveness study

Steve Wong, Jim Bohnsack, Doug Harper, Darlene Johnson, Cynthia Yeung, Steve Swartz, and Peter Thompson



Repeated Measures ANOVA

Year effect significant within each SPA (regression also shows significant increasing trend):

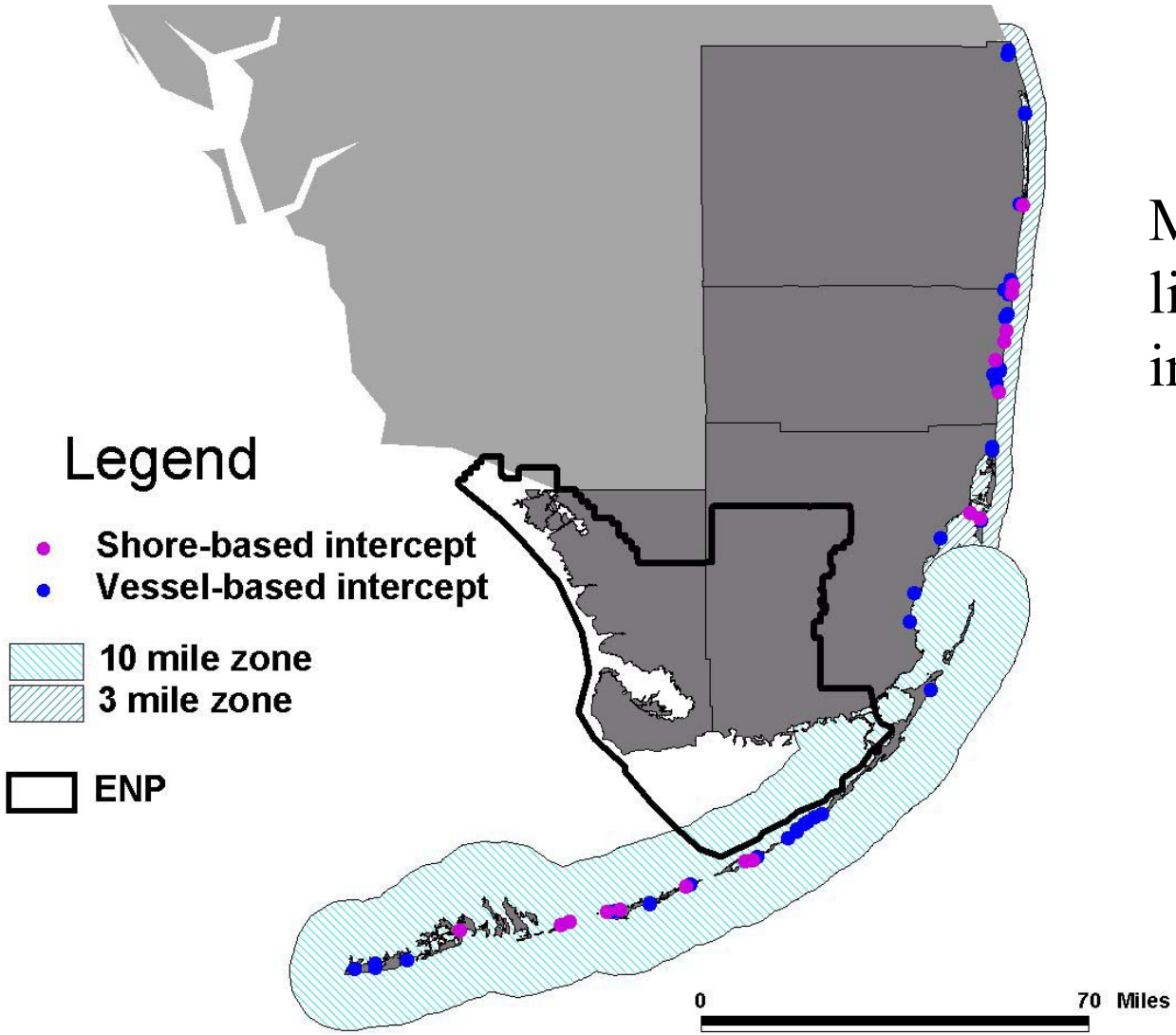
Error: Within

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
YR	1	842.147	842.1470	9.424849	**0.003517618**
Residuals	48	4288.987	89.3539		

External Data

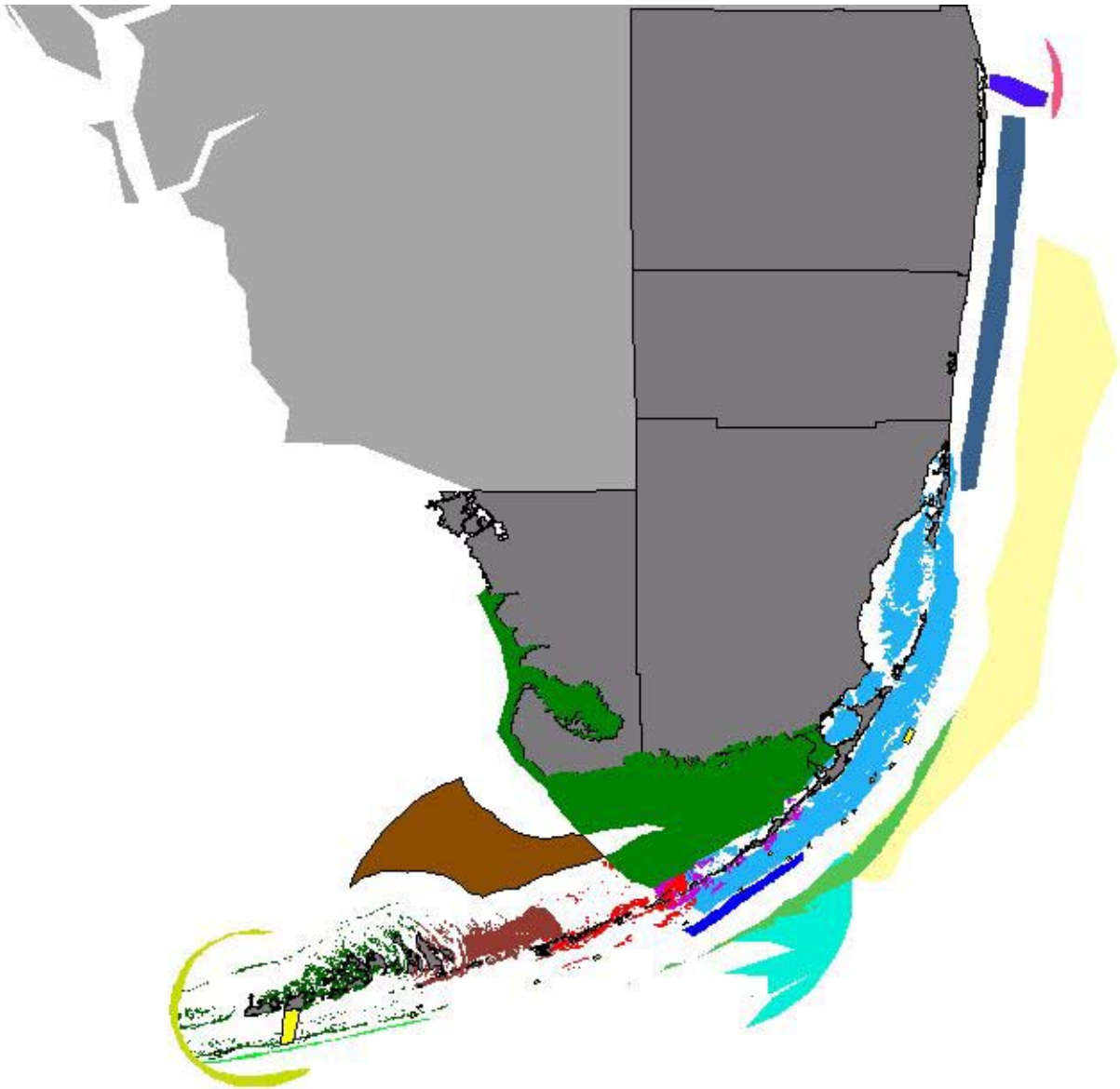
- Bathymetry, water temperature (surface and profile), salinity, shoreline, phytoplankton, turbidity, bottom types, wetland types, sea states, nutrient profiles, currents, upwellings
- Weather
- Shipping lanes, oil/gas structures
- Remote sensing products – SST, aerial imagery, etc.
- Census of human population – census tracks, zip codes, etc.

Improving spatial utility of fisheries data



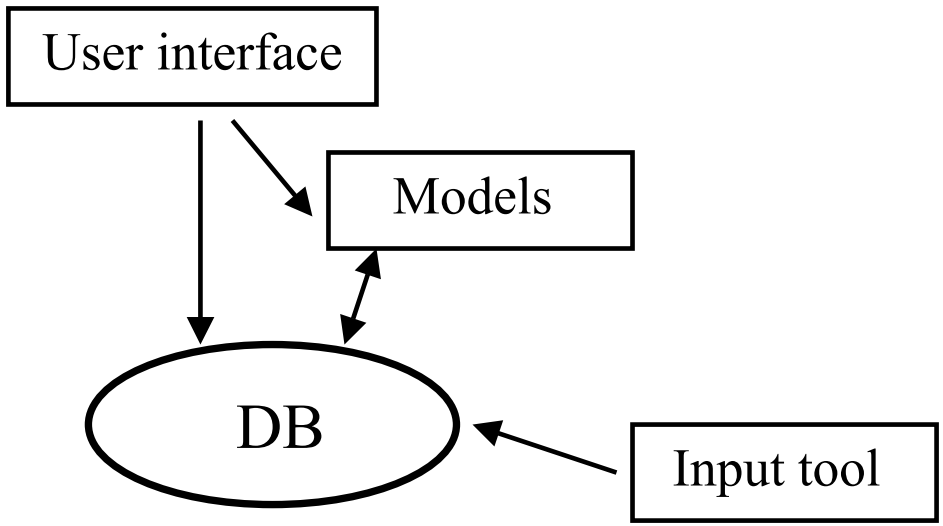
MRFSS data – limited spatial information

Improving spatial utility of fisheries data



MRFSS data – spatial info on vessel-based effort, and valuable for socioeconomic analysis

A Science-driven Ecosystem GIS



Partnership

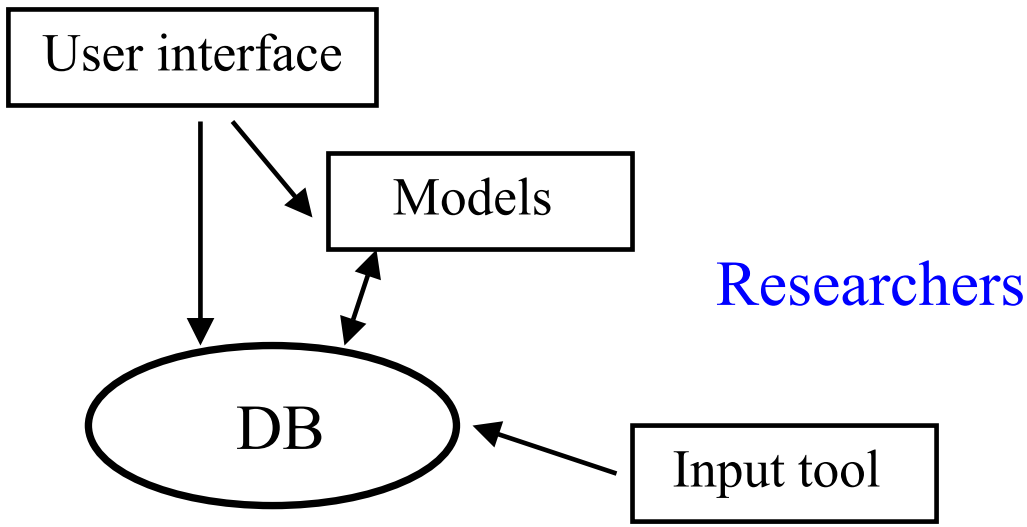
- OBIS-SEAMAP
- NMFS GIS Working Group
- University of Miami

Ecosystem of Ecosystem GIS

- Ecosystem roles
- Ecosystem services

A Science-driven Ecosystem GIS

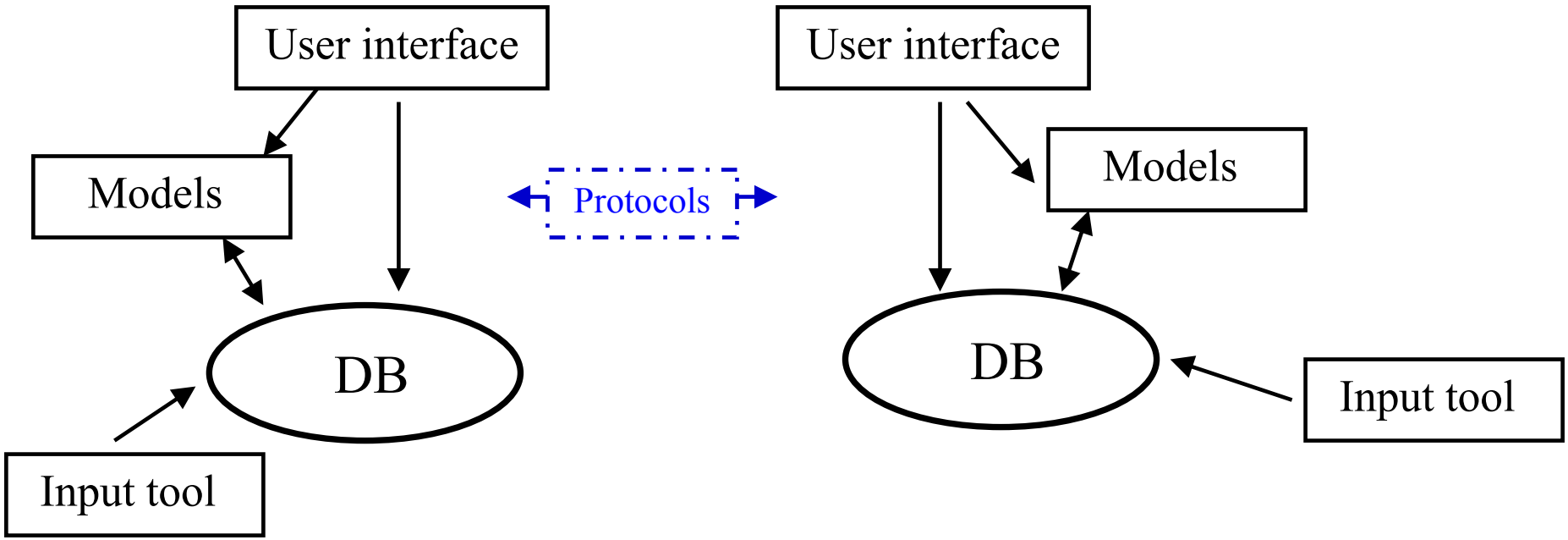
Policy/decision makers,
Researchers



Researchers

Researchers,
IT staff

A Science-driven and Service-oriented Ecosystem GIS



Common Data and Tools Shareable NMFS-wide

- Oceanographic data
- Bathymetry
- Habitats
- Shoreline
- Management boundaries
- Metadata
- Etc.

- Data summary
- Report generation
- Etc.

Accessing Data Residing in Regional Science Centers

• Ecosystem GIS requires large amount of data in a timely fashion.

However,

• Fisheries data require a lot of work on quality control,

• There is an issue of handling privacy information,

• There is a fear of data misinterpretation,

• Researchers are rewarded for paper publishing, not data publishing.